



Real Time Detection of Chemical and Biological Threat Contaminants in Water



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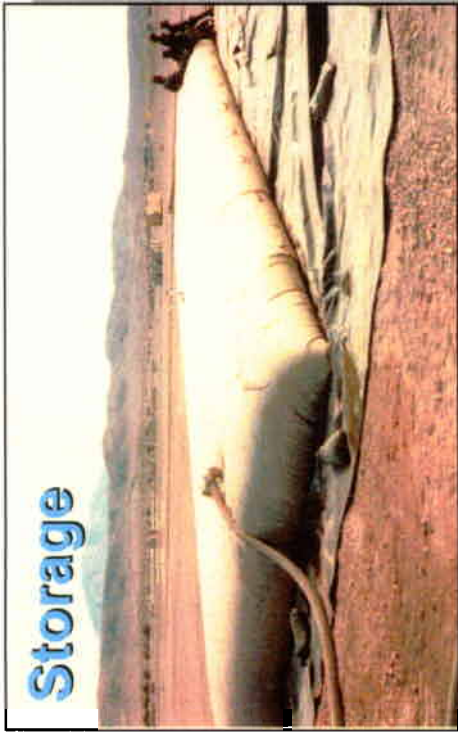
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ARMY'S MISSION AREAS



Storage



Distribution



Quality



Treatment



Importance of Water



THE WORLD'S
ULTIMATE WEAPON
RUNS ON WATER.



**EVERYTHING ELSE
RUNS ON FUEL**





LABORATORIES



Fuels and
Hydraulic Fluids



Water
Chemistry

Oils and
Lubricants



Instrumentation



EQUIPMENT



Reverse Osmosis
Test Area (L) and
Reverse Osmosis
Controls (R)



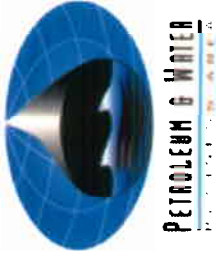
Fuel
Handling
Test Area
Water and
Wastewater
Components
Test Area





Program Objective

DUAL USE



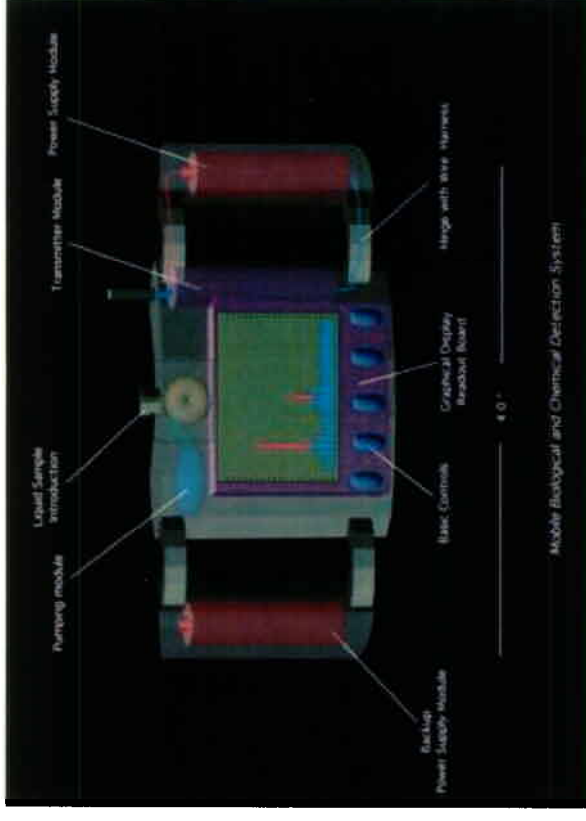
Develop field hardened hand-held /
in-line water quality monitoring
equipment to protect troops and
civilians from biological and
chemical threats in real time



Requirements



- Real time results (5-15 minutes)
- Handheld device
- Minimize/ self powered
- Minimize false positive and false negatives
- Minimize complexity (no specialized training)
- Minimize logistical requirements
- Maximize sensitivity
- Minimize costs.
- The awardee will be required to deliver a demonstrator to the government.





Approach



PETROLEUM & WATER
UNIVERSITY OF TEXAS AT AUSTIN

- One (1) major contract for \$2.5M to develop hand-held detector based on Micro-Electro-Mechanical Systems (MEMS) platform.

- Three (3) contracts for \$100K each to investigate feasibility of novel concepts that can be integrated into a MEMS platform.

| Bacterial Species |
|---|
| <i>Escherichia coli</i> |
| <i>Escherichia coli</i> <i>O157:H7</i> |
| <i>Pseudomonas aeruginosa</i> |
| <i>Yersinia enterocolitica</i> |
| <i>Bacillus cereus</i> |
| <i>Bacillus subtilis</i> |
| <i>Enterococcus faecalis</i> |
| <i>Listeria monocytogenes</i> |
| <i>Staphylococcus</i> |



Determining Beach Closings



- *E. coli* 126 per 100 ml
- Enterococci 33 per 100 ml.
- The Common techniques used to determine bacteria populations are slow.
 - Standard Method – plate counts
 - 48 hours (minimum) results, must be done at a biological laboratory
 - Modified plate counts – Dip slide
 - 24 hours results +/- 1 log



Metropolitan Beach Metropark

Mount Clemens, Michigan



PETROLEUM & WATER
MANAGEMENT SYSTEMS

| 25. Advisories/Closings Reporting | |
|---|------------|
| Action Type: | Closing |
| Start Date: | 09/26/2002 |
| End Date: | 09/30/2002 |
| Total number of days posted: | 5 |
| Is this part of a general or area-wide advisory or closing? | No |
| Percent of this beach affected: | 100 % |

| |
|---|
| Reason(s): |
| Monitoring that revealed elevated bacteria levels |

| |
|--|
| Source(s): |
| CSO, SSO, POTW, Septic systems, Boat discharge, Storm water runoff, Wildlife |



Current Status



- 4 Contract Awards 15th August 03
- Follow on Funding 15th June 04
- Contract Deliverables 30th February 05
- Lab Verification 30th March 05
- Field Assessment and Insertion of Technologies



Related Work



Monitoring :

- ARDESTA- Develop basic water quality parameters on a chip
- Office of Naval Research (ONR)- Michigan State – indirect and direct electrochemical detection.

Sample Concentration:

- American Water Works Association (Awwa) Research Foundation funded RFP 2908 EXTRACTION METHODS FOR EARLY/REAL-TIME WARNING SYSTEMS FOR BIOLOGICAL AGENTS in the amount of 300k and currently a board is reviewing proposals from a recent RFP 2985 for an award in the amount of 300K for the same topic
- Army Research Office (ARO)-Fluorescent Coated Filters for the Detection of Biological Warfare Agents in water.
- ONR-Foster-Miller- Dissolved Air Flotation, Concap, coagulant, and surface skimmer.



Participating Colleagues

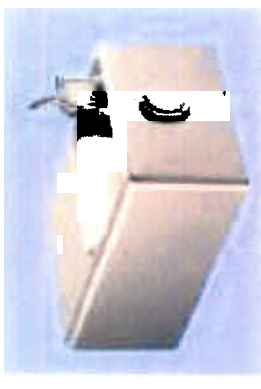


- US Army Soldier, Biological & Chemical Command (SBCCOM)
- CHPPM
- AMEDDC&S
- Oakland County-Public Health Department
- Macomb County - Public Health Department
- Wayne County -Public Health Department
- St. Clair County -Public Health Department



Benefit

- Real Time Detection
- Cooperative effort between the local health departments and the military.



- Provide better detection tools to ensure the safety of the public and the soldiers.

